

REMARKS

At the issuance of the Office Action, claims 1-5, 10-14, 21, 24-29 and 99-145 were pending. In the Office Action, the Examiner withdrew from consideration claims 100-105, 112-115, 121, 122, 133-136, 142 and 143 and rejected claims 1-5, 10-14, 21, 24-29, 99, 106-111, 116-120, 123-132, 137-141, 144 and 145. By this Response, Applicants have amended claim 1, cancelled claims 99, 107 and 128 and added new claims 146-149. These amendments do not add any new matter. Upon entry of these amendments, claims 1-5, 10-14, 21, 24-29, 100-106, 108-127 and 129-149 will be pending in the present application and are believed to be in condition for allowance. In view of the foregoing amendments and the following remarks, Applicants respectfully request reconsideration and allowance of all pending claims.

Interview Summary

In accordance with 37 C.F.R. § 1.133 and M.P.E.P. § 713.04, Applicants present the following summary of a telephonic interview between the Examiner, John J. Figueroa, and Applicants' Attorney, Corey S. Tumey, Reg. No. 57,079, conducted on April 4, 2007. In the interview, the rejection of claims 1-3, 6, 8-11, 13, 82, 84 and 85 under 35 U.S.C. § 103(a) in view of Weaver et al., U.S. Patent No. 4,460,627 (hereafter referred to as "the Weaver reference") was discussed. No specific agreement was reached as to allowable claim language.

First, the parties discussed the recitation in independent claim 1 of wherein "the hydrophobically modified water-soluble polymer reduces the permeability of the subterranean formation zone to aqueous-based fluids." Applicants noted that the Table in Column 9 of the Weaver reference specifically discloses branched polymers with a hydrophobic modifying portion as increasing water permeability. Applicants also noted that Sample No. 7 in Table 10 of the Weaver reference is not a hydrophobically modified polymer in that it does not have a hydrophobic branch. Applicants further noted that, in the Office Action, the Examiner incorrectly referred to the methoxy-polyethylene glycol branch of Sample No. 7 as a hydrophobic branch. It was believed that the representation of the hydrophobically modified polymers as reducing the permeability of the subterranean formation zone aqueous-based fluids would distinguish the Weaver reference.

Moreover, the parties discussed the amendment of independent claim 1 to recite a hydrophobically modified polymer comprising a hydrophobic branch, “wherein the hydrophobic branch comprises an alkyl chain of from about 4 to about 22 carbons without any intervening hydrocarbons.” Applicants specifically noted that, in addition to not disclosing a hydrophobic branch, Sample No. 7 in Table 10 does not contain a hydrophobic branch that comprises an alky chain from about 4 to about 22 carbons as recited in amended claim 1. It was believed that the representation of the hydrophobic branch as recited in the present claims would distinguish the Weaver reference.

Claim Rejections Under 35 U.S.C. § 102

In the Office Action, the Examiner rejected claims 1-5, 10, 12, 14, 21, 24-29, 99, 106-111, 117, 119, 120, 123-132, 138, 140, 141, 144 and 145 under 35 U.S.C. § 102(b) as being anticipated by the Weaver reference. Applicants respectfully traverse these rejections.

Legal Precedent

Anticipation under Section 102 can be found only if a single reference shows exactly what is claimed. *See Titanium Metals Corp. v. Banner*, 227 U.S.P.Q. 773 (Fed. Cir. 1985). For a prior art reference to anticipate under Section 102, every element of the claimed invention must be identically shown in a single reference. *See In re Bond*, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990).

The Weaver reference does not disclose a hydrophobically modified polymer that reduces the permeability of the subterranean formation to aqueous-based fluids as recited in independent claims 1, 106 and 127.

In relevant part, independent claims 1, 106 and 127 each generally recite a hydrophobically modified polymer that reduces the permeability of the subterranean formation to aqueous-based fluids. In the Office Action, the Examiner stated the following with respect to this recitation:

Weaver further discloses that a preferred class of polymers for altering aqueous fluid properties, such as altering water-oil ratio in a formation process and enhancing oil production, are polymers containing 2-hydroxypropyl N,N dialkyl-amine as backbone units and acrylamide (organic acid

derivative) or epichlorihydrin reacted with polyalkoxide as the branch units. (Col. 42, lines 31-37). In Procedure O beginning on col. 50, line 5, Weaver discloses an example of altering the permeability of a formation surface (change in water-oil ratio) by injecting into the formation a copolymer of *polydimethylaminoethyl methacrylate (PDMAEM having MW of 1 million) grafted with a polyethylene oxide branch (PEO, MW of 15,000)*. The resulting data showing reduction in water permeability of the formation is shown in Tables 7 and 8. (See also Tables 10-13 on col. 57-59 for permeability data of an aqueous treating solution containing 1% of a *hydrophilic PDMAEM polymer (MW of 600-800K) branched with a hydrophobic methoxy-polyethylene glycol epichlorihydrin (MPEO) adduct; particularly polymer #7 of Table 10*). In Tables 14-15 on col. 59, Weaver further discloses PDMAEM:PEO/MPEO weight ratios for the branched polymer ranging from 0.5:1.0 to 1.25 to 0.25.

Regarding the limitation in independent claims 1, 106 and 127 concerning hydrophobically modified water-soluble polymer reducing the permeability of the subterranean formation to an aqueous-based fluid, Weaver discloses results demonstrating reduction in water permeability in the same examples containing the modified polymer discussed above (immediately preceding paragraph) in Tables 10-13 and 14-14 on col. 57-60. (See, e.g., *Sample #7 on Table 10, showing a reduction in water permeability of 85%*).

Office Action Mailed 3/05/2007, pages 5-6 (emphasis added).

Contrary to the Examiner's assertions, the Weaver reference does not teach or suggest a hydrophobically modified polymer that *reduces the permeability of the subterranean formation to aqueous-based fluids*, as generally recited in independent claims 1, 106 and 127. Indeed, the Weaver reference discloses that branched polymers containing a hydrophobic modifying portion function to increase water permeability. See Weaver, col. 7, lines 43-52. In relevant part, the Weaver reference describes such branched polymers as follows:

In yet another aspect of the invention, another class of polymers can be prepared which have some *hydrophobic and/or oleophilic portions, branches or overall natures* so that these polymers can be attached to formations or suspended within fluids in the formation to produce a surface effect on the particles or formation which retards the flow of organic fluids

or hydrocarbon fluids and *increases the permeability of the formation to aqueous fluids.*

Id. (emphasis added). As such, the Weaver reference discloses that the branched polymers containing the hydrophobic modifying portion increase the formation's permeability to aqueous fluids, and thus the Weaver reference does not disclose a hydrophobically modified polymer that reduces the permeability of the subterranean formation to aqueous-based fluids, as generally recited in independent claims 1, 106 and 127.

In further support of this conclusion, Applicants direct the Examiner's attention to the Table provided in column 10 of the Weaver reference entitled "Characteristics of Branched Polymers." In this table, the branched polymers containing hydrophobic modifying portions are indicated as having the functionality of increasing water permeability. Applicants additionally note that this table also indicates that the branched polymers containing hydrophobic modifying portions are soluble in organic solvents rather than in aqueous fluids. This is in further contrast to Applicants' independent claim 1 which recites "*water-soluble relative permeability modifiers.*" (Emphasis added). Accordingly, the Weaver reference does not disclose a hydrophobically modified polymer that reduces the permeability of the subterranean formation to aqueous-based fluids, as generally recited in independent claims 1, 106 and 127.

In addition, to the extent that the Weaver reference discloses the use of the branched polymers to reduce the flow of aqueous fluids, Applicants respectfully submit that the Weaver reference does not disclose that the branched polymers containing the hydrophobic modifying portions function to reduce the flow of aqueous fluids. Rather, as discussed above, the only disclosure of the branched polymers containing hydrophobic modifying portions is for *increasing* the flow of aqueous fluids. With respect to reduced flow of aqueous fluids, the Weaver reference consistently discloses that a branched polymer containing hydrophilic branching should reduce the formation's water permeability. Weaver, col. 10, lines 3-25; col. 15, lines 63-66; col. 19, lines 13-17. Indeed, the Weaver reference describes a preferred branched polymer, as follows: "*For one preferred class of polymers used to reduce the flow of water through earthen formations or to reduce the production of water in an oil well, the*

branched chain and overall polymer should be hydrophilic.” Id. col. 19, lines 13-17 (emphasis added). Even further, the Weaver reference provides example data of a number of modified polymers showing water-permeability reduction. However, Applicants respectfully submit that the Weaver reference is devoid of any such data showing water-permeability with a branched polymer having hydrophobic branches. *See id. col. 50, line 25 to col. 69, line 30.* The Weaver reference, however, does provide extensive data showing the permeability reduction achieved utilizing a branched polymers having hydrophilic branches. *See, e.g., id. col. 57, lines 1-45* (achieving 85% water-permeability reduction with a graft copolymer having a *hydrophilic* poly(dimethylaminoethyl methacrylate) backbone and *hydrophilic* methoxy-polyethylene glycol branches). Accordingly, the Weaver reference does not disclose a hydrophobically modified polymer that reduces the permeability of the subterranean formation to aqueous-based fluids, as generally recited in independent claims 1, 106 and 127.

In the Office Action, the Examiner improperly equated polymers containing 2-hydroxypropyl N,N dialkyl-amine as backbone units and acrylamide (organic acid derivative) or epichlorohydrin reacted with polyalkoxide with the claimed hydrophobically modified polymer. *See Office Action, pages 5-6.* Even more specifically, the Examiner improperly equated a polyethylene oxide (or glycol) branch and a methoxy-polyethylene oxide (or glycol) branch with a hydrophobic branch. *See id.* Examples of such graft polymers having methoxy-polyethylene glycol branches are provided as Sample 7 of Table 10 in the Weaver reference. *See Weaver, col. 57, lines 1-43.* Applicants respectfully submit that such branches of polyethylene oxide (or glycol) are hydrophilic. Indeed, polyethylene oxide (or glycol) and methoxy-polyethylene oxide (or glycol) are clearly water soluble and hydrophilic. Accordingly, rather than being hydrophobic, the branches of PEO and methoxy-PEO contained in the branched polymers of the Weaver reference are clearly hydrophilic branches. Therefore, the example data relied on by the Examiner does not disclose a hydrophobically modified polymer that reduces the permeability of the subterranean formation to aqueous-based fluids, as generally recited in independent claims 1, 106 and 127.

Accordingly, the Weaver reference does not disclose each and every feature recited in the present independent claims and thus cannot anticipate the present independent claims or the claims dependent therefrom. Therefore, Applicants respectfully request that the Examiner

withdraw the rejections under 35 U.S.C. § 102(b) with respect to the Weaver reference and provide an indication of allowance for all of the pending claims.

The Weaver reference does not disclose a hydrophobically modified polymer comprising a hydrophobic branch having an alkyl group of from about 4 carbons to about 22 carbons as recited in independent claim 1.

Furthermore, independent claim 1 has been amended to clarify features of embodiments of the present invention. Embodiments of the present application relate to treatment fluids that comprise hydrophobically modified polymers. See Application, ¶ [0019]. As described in the specification, the phrase “hydrophobically modified polymer” refers to the incorporation into the hydrophobic polymer structure of hydrophobic groups having an alkyl chain length of from 4 to about 22 carbons. See *id.* Accordingly, independent claim 1 has been amended to more clearly describe the hydrophobically modified polymers present in the claimed treatment fluid. Specifically, independent claim 1 has been amended to recite that the hydrophobically modified polymer comprises a hydrophobic branch, “the hydrophobic branch comprising an alkyl chain of from about 4 to about 22 carbons without any intervening heteroatoms.”

Applicants respectfully submit that the Weaver reference does not disclose or suggest a hydrophobically modified polymer comprising a hydrophobic branch wherein “the hydrophobic branch comprises an alkyl chain of from about 4 to about 22 carbons without any intervening heteroatoms.” Rather, the branched polymers of the Weaver reference generally comprise combinations of hydrocarbon radicals and hetero groups. See *Weaver*, col. 5, lines 61 to col. 6, line 12. Indeed, as illustrated by the structures provided in column 6, the branches clearly contain intervening hetero groups. See *id.* col. 5, lines 1-12. Further, the branched chain is an average of at least two polymeric units in length. See *id.* col. 5, lines 33-37. The Weaver reference describes preferred groups for the branched chains as polyalkylene imines and polyalkylene oxides with alkylene radicals of from about 1-3 carbon atoms. See *id.* col. 19, lines 10-13. Additional monomer units that can be used to form the branched chains include acrylamide, acrylate, vinyl alcohol, vinyl ethers, hexose, allyl alcohol, allyl amines, substituted derivatives thereof such as sulfonated acrylamide, as well as copolymers and combinations thereof. See *id.* col. 19, lines 13-21. Whether or not any of these listed

monomers for forming the branched chains would form the claimed hydrophobic branch, the monomers would clearly not form a branch having an alkyl chain of from about 4 to about 22 carbons, as recited in independent claim 1. For example, Sample No. 7 in Table 10 discloses a graft polymer of a poly(dimethylaminoethyl methacrylate) salt grafted with a methoxypolyethylene glycol epichlorohydrin adduct. While, as described above, the methoxypolyethylene glycol is not a hydrophobic branch, the methoxypolyethylene glycol also does not have an alkyl chain of from about 4 to about 22 carbons without any intervening heteroatoms. Therefore, the Weaver reference does not disclose each and every recitation of independent claim 1.

Accordingly, for this additional reason the Weaver reference does not anticipate independent claims 1, 106 and 127. Therefore, Applicants respectfully request that the Examiner withdraw the rejections under 35 U.S.C. § 102(b) with respect to the Weaver reference and provide an indication of allowance for all of the pending claims.

Claim Rejections Under 35 U.S.C. § 103

In the Office Action, the Examiner rejected claims 11-14, 116-119 and 137-140 under 35 U.S.C. § 103(a) as being unpatentable over the Weaver reference in view of Waggenspack et al., U.S. Patent No. 6,358,889 (hereafter referred to as “the Waggenspack reference”). Applicants respectfully traverse these rejections. Claims 11-14 depend on independent claim 1, claims 116-119 depend on independent claim 106 and claims 137-140 depend on independent claim 127. Thus, each of the claims rejected under 35 U.S.C. § 103 depends from a claim rejected under 35 U.S.C. § 102, based on the Weaver reference. As described above, the Weaver reference does not disclose each and every recitation of the independent claims. It should be noted that the Waggenspack reference does not remedy the deficiencies of the Weaver reference. As such, none of the references, taken alone or in hypothetical combination, can render the recited subject matter obvious. Accordingly, Applicants respectfully request that the Examiner withdraw each of the rejections under 35 U.S.C. § 103.

Remarks Regarding Withdrawn Claims

Claims 100-105, 112-115, 121, 122, 133-136, 142 and 143 have been withdrawn from consideration. Withdrawn claims 100-105 depend from independent claim 1, withdrawn claims 112-115, 121 and 122 depend from independent claim 106 and withdrawn claims 133-136, 142 and 143 depend from independent claim 127. Accordingly, once the Examiner determines that the present independent claims are allowable, Applicants request rejoinder of the withdrawn claims, including examination of the formerly nonelected species on the merits. In addition, because independent claims 1, 106 and 127 are in condition for allowance for the reasons stated above, Applicants respectfully submit that withdrawn claims 100-105, 112-115, 121, 122, 133-136, 142 and 143 are also in condition for allowance. Therefore, Applicant requests that the Examiner provide an indication of allowance for withdrawn claims 100-105, 112-115, 121, 122, 133-136, 142 and 143.

Remarks Regarding New Claims

As set forth above, Applicants have added new claims 146-149. For the reasons discussed above and for additional reasons relating to other claim features, Applicants believe that these claims are patentable over the cited references and in condition for allowance. First, Applicants assert, as discussed above regarding the Section 102(b) rejections, that the Weaver reference does not disclose all of the features recited in independent claims 106 and 127. For this reason alone, claims 146-149, which are dependent thereon, are also allowable. In addition, claims 146-149 recite features that are not disclosed in the Weaver reference. For example, claims 146 and 148 recite that “the hydrophobically modified water-soluble polymer comprises a polymer backbone and a hydrophobic branch, the *hydrophobic branch comprising an alkyl group of from about 4 carbons to 22 carbons without any intervening heteroatoms.*” (Emphasis added). Therefore, Applicant requests that the Examiner allow new claims 146-149.

Payment of Fees and Authorization for Extensions of Time

No fees are believed to be due at this time. If any fees, including fees for extensions of time and other reasons, are deemed necessary to advance prosecution of the present application, at this or any other time, Applicants hereby authorize the Commissioner to charge such requisite fees to Deposit Account No. 06-1315; Order No. HLBT:0036. In

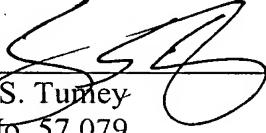
accordance with 37 C.F.R. § 1.136, Applicants hereby provide a general authorization to treat this and any future reply requiring an extension of time as incorporating a request thereof.

Conclusion

Applicants respectfully submit that all pending claims are in condition for allowance. However, if the Examiner wishes to resolve any other issues by way of a telephone conference, the Examiner is kindly invited to contact the undersigned attorney at the telephone number indicated below.

Respectfully submitted,

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